7th Grade
Earth's Surface

Chapter 3: Erosion and Deposition

Lesson 1 (Mass Movement)

Weathering – the chemical and physical processes that break down rock at Earth's surface

Mechanical weathering – when rock is physically broken into smaller pieces

- **ice** – glaciers can pick up particles that grind against rock and ice in cracks expands to break rock
- **flowing water** – carries particles that rub on rock
- **wind** – carries particles that rub on rock
- **plants** – roots grow into cracks in rock, expand, and break them apart
- **animals** – when they dig, the grinding and pushing actions can break down rocks

Chemical weathering – breaks down rock through chemical changes in the rock

- **Water** – can dissolve rock
- **Oxygen** – can react with iron in rock to make it soft and crumbly (The same process that rusts metal objects.)
- **Carbon Dioxide (CO_2)** – dissolves in water, sinks into cracks in rocks, and forms **carbonic acid** that breaks down rock
- **Plant roots** – produce a weak acid that can break down rock
- **Lichens** – (plantlike organisms that grow on rocks) produce weak acids that can break down rock
- **Acid Rain** – is formed by pollutants in the air reacting with water vapor to produce acids

Erosion – the process by which natural forces move weathered rock and soil from one place to another

- Gravity, moving water, glaciers, waves, and wind are all causes, or **agents**, of erosion.

Sediment – the particles moved by erosion

- pieces of rock or soil, the remains of plants and animals

Deposition – process in which sediment is laid down in a new location

The cycle of erosion and deposition is never-ending – as a mountain wears down in one place, new landforms build up in another place as material is moved from place to place.

Mass movement – any process by which gravity moves sediment downhill

Types of Mass Movement:

1. **Landslide** – when rock and soil slide quickly down a steep slope
2. **Mudflow** – the rapid downhill movement of a rock, soil, and water mixture (after heavy rains)
   - Can occur on very gentle slopes if there is a lot of clay particles in the soil.
3. **slump** – an unbroken mass of rock and soil suddenly slips down a slope (moves down in one large mass)
4. **Creep** – the very slow downhill movement of rock and soil (so slow it is not noticeable, but causes objects like posts and buildings to lean over time.)

Lesson 2 (Water Erosion)

Runoff – water that flows over the ground surface, rather than soaking into the ground

- More runoff means more erosion.

Runoff depends on:

1. amount of rainfall received
2. amount of vegetation in the area – plants absorb water and hold soil in place
3. soil type – some soils absorb more water than others
4. shape of the land – steep land has more runoff than flat land
5. how people use the land – parking lots and crop-less fields will have more runoff

Rill – a tiny groove in soil made by running water
- As many rills flow into one another, they grow larger, forming **gullies**.

Gully – a large channel in soil made by running water
- Gullies join together to form **streams**.

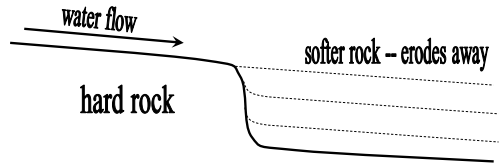
Stream – a channel that has a continuous flow of water
- Streams grow into larger streams or rivers by receiving water from **tributaries**.

Tributary – a stream that joins with other streams to form one main river

Watershed – the area of land from which a river and its tributaries collect their water (the area drained by a river system)

Rivers create:

1. **valleys** – formed in steep areas when the slopes along the river erode
2. **waterfalls** – formed when softer rock downstream from harder rock erodes away, creating a ledge



3. **flood plain** – a wide valley through which a river flows
   - formed as the river spreads out at lower elevations where rivers flow over gently sloping land
4. **meander** – a loop-like bend in the course of a river
   - As a river winds from side to side, it erodes the outer bank and deposits sediment on the inner bank of a bend.
   - Over time, the meander becomes more and more curved.

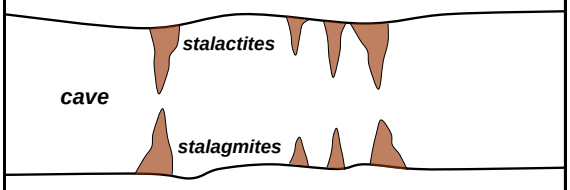
5. **oxbow lake** – a meander that was cut off from a river
6. **alluvial fan** – a wide, sloping deposit of sediment formed where a stream leaves a mountain valley and becomes slower, wider, and shallower
   - When water slows down, it drops some of the sediment it was carrying.
7. **delta** – a landform made of sediments that settled out of a river where it flows into an ocean or lake

groundwater – water that fills the cracks and spaces in underground soil and rock layers

Groundwater Erosion:
- When water sinks into the ground, it combines with CO_2 to produce **carbonic acid**.
- Carbonic acid breaks down limestone underground and is carried away to other empty spaces below ground, creating caves.
- As water carrying dissolved limestone drips into a cave from above, a **stalactite** will form from the cave ceiling.
- As this water drips off a stalactite, a **stalagmite** will form on the cave floor.

stalactite – a calcite deposit that hangs from the ceiling of a cave

stalagmite – a cone-shaped calcite deposit that builds up from the floor of a cave



Lesson 3 (Glacial Erosion)

Two Types of Glaciers:

1. **Continental glacier** – a glacier that covers most of a continent or large island
   – can flow in all directions as they move (like pancake batter in a pan)
2. **Valley glacier** – a long, narrow glacier that forms when snow and ice build up in a mountain valley
   – Form when snow builds up year after year and the weight of the snow compacts it into ice.
   – Move down valleys due to gravity.

Glaciers can only form where more snow falls than melts.

How Glaciers Erode the Land:

1. **plucking** – the process by which a glacier picks up rocks as it flows over the land
   – The weight of a glacier breaks rocks apart, and the rock fragments freeze to the bottom of the glacier.
2. **abrasion** – as the glacier moves, the rocks frozen into the glacier grind against the land, causing gouges and scratches in the bedrock.

Landforms Created by Glaciers:

till – the sediments of different sizes (clay, silt, sand, gravel, boulders) deposited by a glacier as it melts

moraine – a ridge formed by the till deposited at the edge of a glacier

kettle – a small depression that forms when a chunk of ice is left in glacial till
– When the ice melts, the kettle remains, and can later fill with water and forms a kettle lake.

fiord (or fjord) – a narrow inlet formed when the sea rises and fills a valley cut by a glacier

horn – a sharp peak formed when glaciers carved away the sides of a mountain

cirque – a bowl-shaped hollow on a mountainside eroded or formed by a glacier

arête – a sharp ridge separated by two cirques

drumlin – a long mound of till that is smoothed in the direction of the glacier's flow

Lesson 4 (Wave Erosion)

Waves erode the land by:

impact – large waves can hit rocks with such force as to break rocks apart

abrasion – sand particles in waves can rub against rock and wear them down

Landforms Created by Wave Erosion:

headland – a part of the shore that sticks out into the ocean
– made of harder rock that has had softer rock around it eroded away

sea cave – formed when waves erode a soft pocket of rock in the shore

sea arch – formed when waves erode softer rock out from under a headland

sea stack – a pillar of rock left standing in the water after a sea arch collapses

Landforms Created by Wave Deposition:
(When water slows down, it drops its load of sediments.)

beaches – when water reaches the shore, sediment is dropped (Not all beaches are made of sand – some contain a lot of shells, coral, and gravel.)

Longshore drift – the movement of water and sediments down a beach caused by waves coming into shore at an angle

– When waves hit the beach at an angle, a current forms parallel to the beach, carrying sediments with it.

spit – a beach that juts out like a finger out into the water, formed by longshore drift

– formed where a headland or other feature interferes with longshore drift, or where the coastline turns sharply

sandbar – a long ridge of sand that runs parallel to the shoreline formed by wave action

barrier island – formed when powerful storm waves pile up large amounts of sand above sea level to form a long, narrow island parallel to the coast (similar to a sandbar, but much larger)

Lesson 5 (Wind Erosion)

How Wind Causes Erosion:

1. deflation – wind erosion that removes surface materials

Deflation can cause:

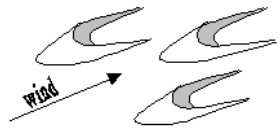
desert pavement – where wind has blown away all the smaller sediment and left a very hard surface of only heavier rocky material

2. abrasion – wind-carried sand can polish rock to a smooth appearance

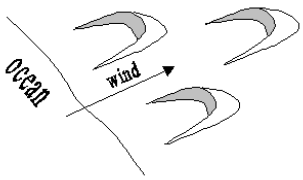
Wind Deposition:

1. When wind slows down, or some obstacle blocks the wind, sediments drop to the ground to form **sand dunes or soil drifts**.

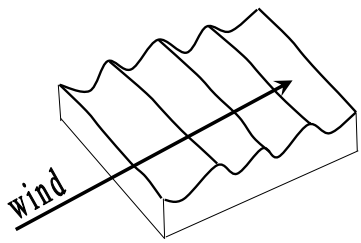
barchan dunes – are crescent-shaped dunes formed when wind stays in the same direction and the supply of sand is limited.



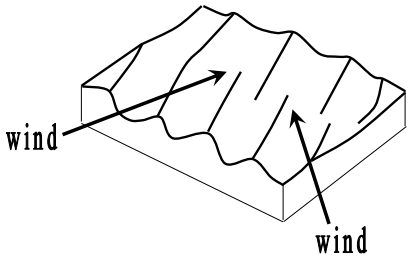
parabolic dunes – are crescent-shaped dunes that form along coasts and point away from the wind blowing in off the water.



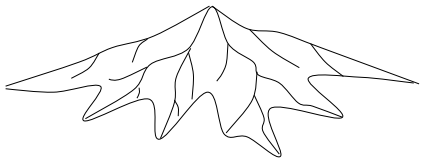
transverse dunes – form when the wind direction stays the same and the supply of sand is large.



longitudinal dunes – formed when the wind blows in two slightly different directions and the supply of sand is limited.



star dunes – are formed when wind blows in 3 or more different directions (changes frequently).



Dunes can slowly move over time.

– Sand from one side of the dune blows over the top of the dune and is dropped on the other side.

2. Sediments finer than sand (such as clay and silt) can also drop to the ground in layers called **loess**.

Loess – a wind-formed deposit made of fine particles of clay and silt